

CLAIMS

What is claimed is:

1. A liner bolt removal tool for removing a liner bolt, comprising:
a tubular barrel having a first end, an opposing second end, an outer surface and a chamber disposed therein;
a projectile slidably disposed in said chamber of said barrel;
a front end cap assembly disposed at said first end of said barrel, said front end cap assembly having a first end, second end and an impactor reciprocally disposed therein, said impactor having a first end to impact the liner bolt and a second end in communication with said chamber of said barrel to be impacted by said projectile; and
a rear valve assembly disposed at said second end of said barrel, said rear valve assembly having an inlet adaptable for connection to a supply of compressed air and an outlet in communication with said chamber for delivery of compressed air to said chamber to project said projectile against said second end of said impactor.
2. The liner bolt removal tool according to claim 1, wherein said projectile is made of a first material that is softer than a second material used for said impactor.
3. The liner bolt removal tool according to claim 1, wherein said projectile comprises at least one wear ring disposed around said projectile, said wear rings sized and configured to tightly dispose said projectile in said chamber.
4. The liner bolt removal tool according to claim 1, wherein said projectile is cylindrically shaped, said projectile having a first end and an opposing second end.

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5. The liner bolt removal tool according to claim 4, wherein said first end of said projectile is shaped and configured to expand upon impact with said impactor without an increase in the diameter of said projectile.

6. The liner bolt removal tool according to claim 4 further comprising a projectile connector at said second end of said projectile, said projectile connector configured to releasably connect to a latch connector at said second end of said barrel.

7. The liner bolt removal tool according to claim 6, wherein said latch connector is on a rear cap assembly disposed between said second end of said barrel and said rear valve assembly.

8. The liner bolt removal tool according to claim 1, wherein said front end cap assembly further comprises a spring disposed around said impactor, said spring configured to hold said impactor in a firing position.

9. The liner bolt removal tool according to claim 8, wherein said limiting means comprises an impactor spring and a spring retainer disposed around said impactor.

10. The liner bolt removal tool according to claim 1 further comprising a bolt guide at said first end of said front end cap assembly, said bolt guide comprising a spring mounted guide ring.

11. The liner bolt removal tool according to claim 1 further comprising an impact absorbing means disposed at said second end of said front end cap assembly for absorbing the impact of said projectile against said second end of said front end cap assembly.

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12. The liner bolt removal tool according to claim 11, wherein said impact absorbing means limits movement of said impactor upon contact of projectile against said second end of said front end cap assembly.

13. The liner bolt removal tool according to claim 1 further comprising a front valve assembly at said first end of said barrel, said front valve assembly configured to vent air from inside said chamber during the forward movement of said projectile.

14. The liner bolt removal tool according to claim 13, wherein said front valve assembly is further configured to deliver compressed air to said first end of said barrel to move said projectile from said first end of said barrel to said second end of said barrel.

15. The liner bolt removal tool according to claim 1 further comprising a suspension assembly attached to said tool.

16. The liner bolt removal tool according to claim 1, wherein said tool is configured to be mounted on a frame.

17. The liner bolt removal tool according to claim 1 further comprising a pair of side bars attached to said outer surface of said barrel, said pair of side bars attached on opposite sides of said barrel parallel to the longitudinal axis of said barrel.

18. The liner bolt removal tool according to claim 17, wherein each of said pair of side bars are adapted for mounting said rear valve assembly thereto.

19. The liner bolt removal tool according to claim 17, wherein each of said pair of side bars are adapted for mounting said front end cap assembly thereto.

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20. A liner bolt removal tool for removing a liner bolt, comprising:

a tubular barrel having a first end, an opposing second end, an outer surface and a chamber disposed therein;

a projectile slidably disposed in said chamber of said barrel, said projectile having a first end and a second end, said second end of said projectile having a projectile connector thereon;

a front end cap assembly at said first end of said barrel, said front end cap assembly having a first end, second end and an impactor reciprocally disposed therein, said impactor having a first end to impact the liner bolt and a second end in communication with said chamber of said barrel to be impacted by said projectile;

a rear valve assembly at said second end of said barrel, said rear valve assembly having an inlet adaptable for connection to a supply of compressed air and an outlet in communication with said chamber for delivery of compressed air to said chamber to project said projectile against said second end of said impactor;

a latch connector at said second end of said barrel, said latch connector configured to releasably connect to said projectile connector on said projectile; and

a front valve assembly at said first end of said barrel, said front valve assembly configured to vent air from inside said chamber during the forward movement of said projectile and to deliver compressed air to said first end of said barrel to move said projectile from said first end of said barrel to said second end of said barrel.

21. The liner bolt removal tool according to claim 20, wherein said projectile is generally cylindrical and made from a first material that is softer than a second material used for said impactor.

22. The liner bolt removal tool according to claim 21 herein said first end of said projectile is shaped and configured to expand upon impact with said impactor without an increase in the diameter of said projectile.

23. The liner bolt removal tool according to claim 20 further comprising a bolt guide at said first end of said front end cap assembly, said bolt guide comprising a spring mounted guide ring.

24. The liner bolt removal tool according to claim 20 further comprising an impact absorbing means disposed at said second end of said front end cap assembly for absorbing the impact of said projectile against said second end of said front end cap assembly.

25. The liner bolt removal tool according to claim 24, wherein said impact absorbing means limits movement of said impactor upon contact of projectile against said second end of said front end cap assembly.

26. The liner bolt removal tool according to claim 20 further comprising a pair of side bars attached to said outer surface of said barrel, said pair of side bars attached on opposite sides of said barrel parallel to the longitudinal axis of said barrel, each of said pair of side bars adapted for mounting said rear valve assembly and said front end cap assembly thereto.

27. A liner bolt removal tool for removing a liner bolt, comprising:
a tubular barrel having a first end, an opposing second end, an outer surface and a chamber disposed therein;
a cylindrical projectile slidably disposed in said chamber of said barrel, said projectile having a first end and a second end, said first end of said projectile

shaped and configured to expand without an increase in the diameter of said projectile, said second end of said projectile having a projectile connector thereon;

a front end cap assembly disposed at said first end of said barrel, said front end cap assembly having a first end, second end and an impactor reciprocally disposed therein, said impactor having a first end to impact the liner bolt and a second end in communication with said chamber of said barrel to be impacted by said projectile;

impact absorbing means disposed at said second end of said front end cap assembly for absorbing the impact of said projectile against said second end of said front end cap assembly;

a rear valve assembly disposed at said second end of said barrel, said rear valve assembly having an inlet adaptable for connection to a supply of compressed air and an outlet in communication with said chamber for delivery of compressed air to said chamber to project said projectile against said second end of said impactor;

a latch connector at said second end of said barrel, said latch connector configured to releasably connect to said projectile connector on said projectile; and

a front valve assembly at said first end of said barrel, said front valve assembly configured to vent air from inside said chamber during the forward movement of said projectile and to deliver compressed air to said first end of said barrel to move said projectile from said first end of said barrel to said second end of said barrel.

28. The liner bolt removal tool according to claim 27, wherein said impact absorbing means limits movement of said impactor upon contact of projectile against said second end of said front end cap assembly.

29. The liner bolt removal tool according to claim 27 further comprising a bolt guide at said first end of said front end cap assembly, said bolt guide comprising a spring mounted guide ring.

30. The liner bolt removal tool according to claim 27, wherein said projectile is made from a first material that is softer than a second material used for said impactor.

31. The liner bolt removal tool according to claim 27 further comprising a pair of side bars attached to said outer surface of said barrel, said pair of side bars attached on opposite sides of said barrel parallel to the longitudinal axis of said barrel, each of said pair of side bars adapted for mounting said rear valve assembly and said front end cap assembly thereto.